Nov. 18, 1924. 1,516,408

A. G. SCHUMANN

OIL OR GAS BURNER

Filed Oct. 14, 1922

Fig. 1.

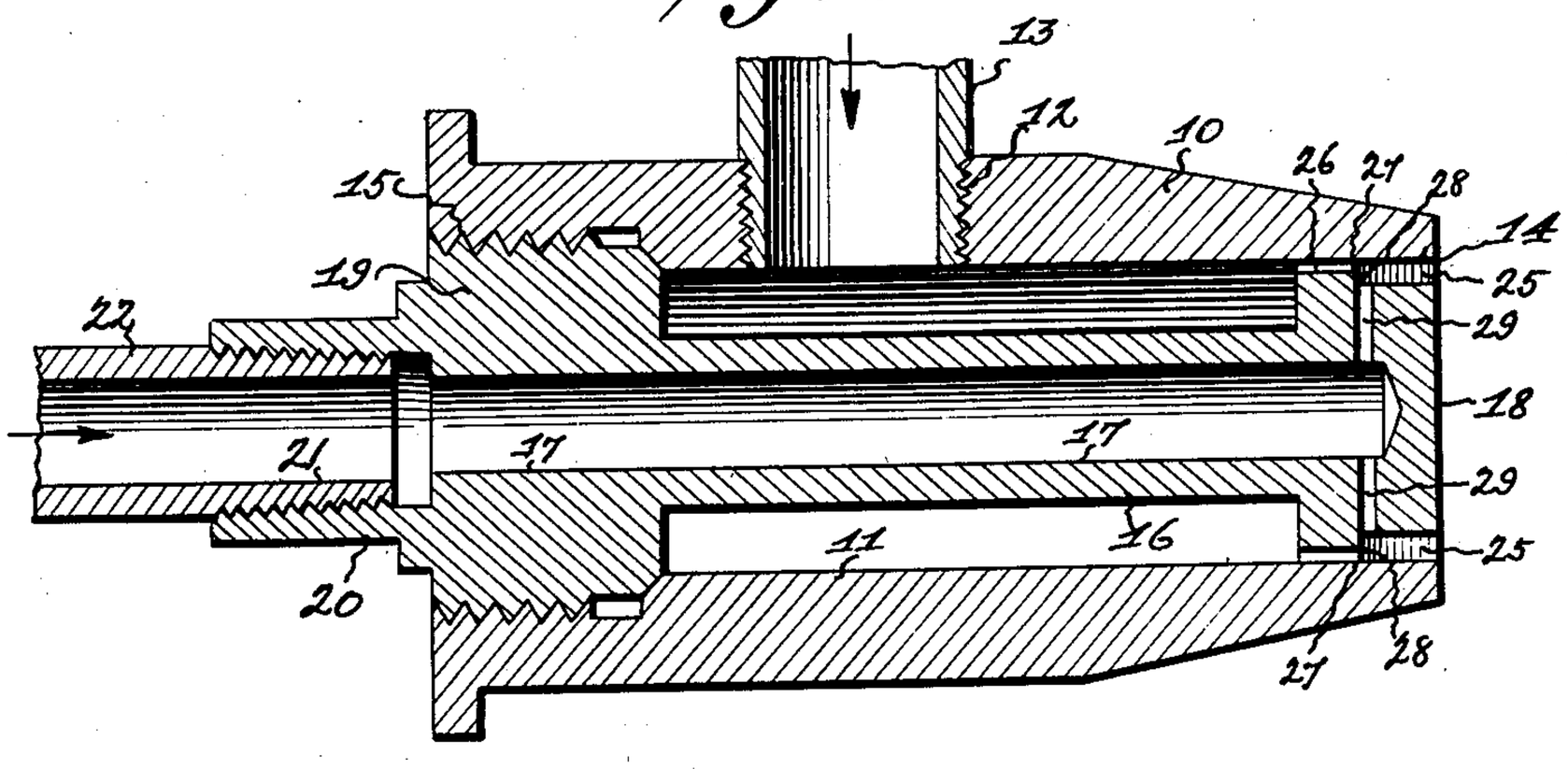


Fig. 2.

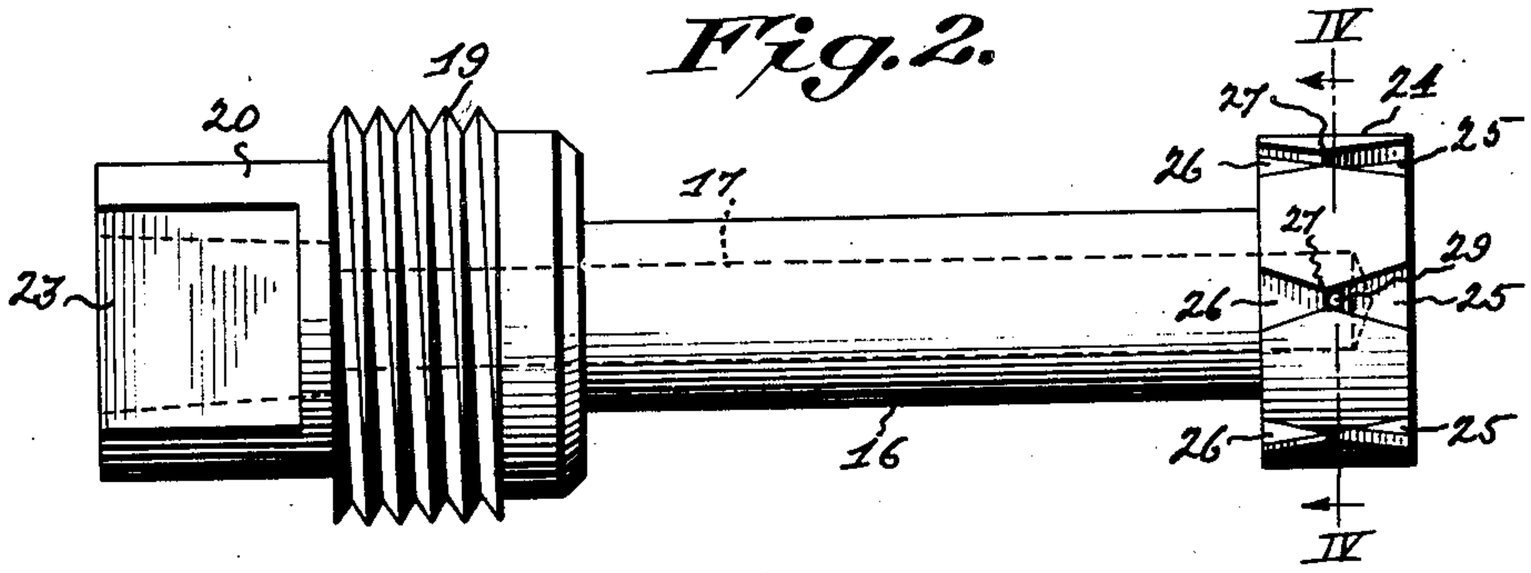


Fig. 3.

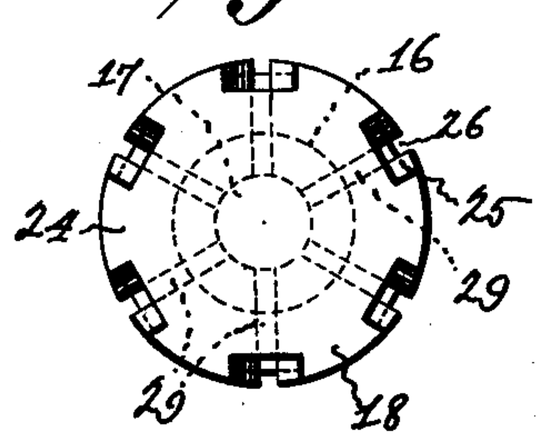
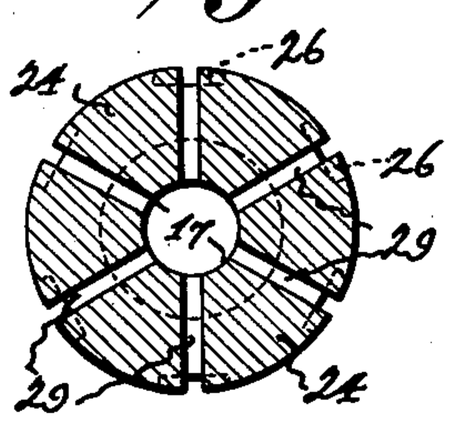


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALFRED G. SCHUMANN, OF BALTIMORE, MARYLAND.

OIL OR GAS BURNER.

Application filed October 14, 1922. Serial No. 594,509.

To all whom it may concern:

Be it known that I, ALFRED G. SCHUMANN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Oil or Gas Burners, of which the following is a specification.

This invention relates to oil or gas burners and of the class which is particularly adapted for use in connection with open hearth, melting, and other metallurgical furnaces which are adapted for the burning of a great variety of fuels, such as coke-oven gas, producer gas, tar and the like in connection with heated air under pressure or super-heated steam employed to atomize and spray said fuels.

The objects of the invention are as follows:—

First, to construct a burner of the character indicated which consists of a minimum number of parts of simple construction and low cost of manufacture, capable of being easily assembled or taken apart for inspection and making repairs or renewal of parts.

Second, to so construct and arrange the cooperating parts of the burner in which the steam or air used to atomize the fuel is made to pass through an orifice of Venturi-shape, so that when said air or steam is at the highest velocity and its most contracted state at the throat of said orifice, the fuel is drawn in by said steam or air and immediately expanded, thereby causing a thorough intermingling and atomization of the fuel and consequently the maximum production of heat from a given quantity of said fuel.

Third, to so construct and arrange the cooperating parts of the nozzle of the burner, so that the steam or air passing over the point of admission of the fuel in said nozzle will produce a partial vacuum, and owing to the high velocity of said steam or air at said point of admission, a most effective suction or drawing in of the fuel is accomplished, thereby efficiently assisting in the complete atomization of the fuel and thorough and uniform mixture of the fuel with the air or steam.

Fourth, to so construct and arrange the coacting elements of the nozzle of the burner, so that although the steam or air passing through the burner meets and acts on the fuel at a high velocity, said steam or air at no time exerts a back pressure against the flow of the fuel into or during its progresss through the burner, but on the contrary tends to efficiently draw said fuel into the burner nozzle and at all times assist the atomization of the fuel and passage of the mixed fuel and air or steam through and out of the nozzle in such a manner as to produce jets or sprays of combustible vapor issuing from the burner capable of producing a flame of constant and uniform temperature of high degree throughout any desired confined space.

Fifth, other objects and advantages of the invention will manifest themselves from the construction and arrangements of parts and their manner of cooperation which will be hereinafter more fully and clearly disclosed.

The invention consists of structural characteristics and relative arrangements of elements which will be hereinafter more fully described and particularly pointed out in the appended claims.

In the drawings in which similar reference characters indicate the same parts in the several figures:

Figure 1 is a longitudinal section of the improved burner.

Figure 2 is a side elevation of the inner fuel tube and nozzle, or burner with the outer casing removed.

Figure 3 is a view in elevation of the front end of the nozzle shown in Figure 2, and

Figure 4 is a section on line IV—IV of Figure 2.

Referring to the drawings 10 is the outer casing provided with a central bore 11 and a supply opening 12 through which superheated steam or heated air is supplied under pressure into said bore 11 by means of the pipe 13 leading from any suitable source of supply, not shown, and forming no part of the present invention. Said casing 10 is preferably provided at its ends with an unthreaded front opening 14 surrounding the nozzle of the burner and a threaded rear opening 15, as shown.

Within said casing and seated in its bore 11 is provided a hollow fuel nozzle 16 having a longitudinally extending central bore 17, and closed at its outer or spraying end with an imperforate tip or plug 18. The other or inner end of said nozzle 16 is formed with an externally threaded enlarged sec-

tion 19 engaging and adapted to seal the threaded opening 15 of the casing, as will be readily understood.

Extending from the outer end of the section 19 is an internally threaded nipple 20 adapted to engage the threaded end 21 of the fuel pipe 22 suitably connected to any suitable source of fuel supply, not shown, and said nipple 20 may be formed with a non-circular periphery or flattened sides 23, see Figure 2, in order that it may be firmly gripped by a wrench or vise to quickly assemble the parts of the burner, or easily uncouple or withdraw the nozzle 16 from its enclosing casing 10.

The nozzle 16 at its atomizing or spraying end is formed with an annular enlargement 24 of such a diameter as to snugly fit within the outer section or unthreaded end 14 of the bore 11 and seal said atomizing end of the burner with the exception as to ports to be presently described which connect the annular chamber formed between the inner cylindrical wall or bore 11 of the casing 10 and the nozzle 16, with the exterior atmosphere.

On the outer annular surface of the enlargement 24 are arranged a series of radially arranged longitudinally extending discharge ports formed with communicating outwardly flaring front portions 25, and inwardly flaring rear portions 26, and said flaring portions 25 and 26 of each port are so constructed and arranged as to have their constricted, small or throat ends 27 contiguous and at the same point. The inwardly flaring rear portion 26 of each port is preferably arranged on a circle of larger radius than the outwardly flaring front portions 25 and hence farther removed from the axis of the nozzle 16, so that at the section of the ports where the constricted or throat ends 27 of the inwardly flaring rear portions 26 and outwardly flaring front portions 25 join each other a step or depression 28 is formed, as clearly shown in Figure 1, and the bottoms of the outwardly flaring front portions 25 are on a circle of a smaller radius than the bottoms of the inwardly flaring rear portions 25 for purposes to be presently described.

29, 29 are preferably radially arranged passageways or openings which connect the bore 17 of the nozzle 16 with each of the outwardly flaring front portions 24 of the discharge ports at the stepped or depressed end 28 or the constricted or throat ends 27, as clearly shown in Figures 1 and 2, and while I have so shown and described this as my preferred form, I do not limit myself to this exact form and arrangement.

The parts of the burner being constructed and arranged as herein disclosed, the operation is as follows:

The heated air under pressure on the superheated steam being admitted by means of the pipe 13 into the annular chamber within the casing 10 and surrounding the nozzle 16, and the fuel entering into the bore 17 of the nozzle 16 through the fuel supply pipe 22, said fuel passes through the opening or passageways 29, 29, into the smaller or constricted ends of the several outwardly flaring front portions 25 of the longitudinally extending discharge ports, while at the same time the air under pressure or superheated steam passes through the inwardly flaring rear portions 26 of the ports and discharges through the constricted, small or throat ends 27 of said portions 26 and expands with accompanying increasing velocity through the outwardly flaring front portions 25 and in so doing not only acts as a most effective suction medium to draw the fuel through the openings or passageways 29, 29, into the front portions 25, but at the same time efficiently and completely atomizes the fuel and thoroughly and uniformly intermingles said fuel with the air or steam during the passage of the fuel through the outwardly flaring portions 25, and into the atmosphere without in any way causing back pressure to be exerted against the flow of the fuel into the burner or during its flow or passage through any part of the burner.

From the foregoing description of the construction and relation of the parts of the burner and its mode of operation, it will be seen that all the objects and advantages recited in the statement of invention have been fully and efficiently carried out, and while I have shown only one and the preferred form, many other arrangements within the scope of the claims will readily suggest themselves without in any way departing from the essential or material elements of the present burner.

What I claim is:—

1. An oil or gas burner including a hollow nozzle having a plurality of longitudinally extending discharge ports with communicating outwardly flaring front and inwardly flaring rear portions, and said nozzle having apertures at the contiguous or constricted ends and entirely within the outwardly flaring front portions of the discharge ports and establishing communication between the interior and fuel supply of the burners.

2. An oil or gas burner including a nozzle having a central bore and a plurality of superficial longitudinally extending discharge ports with communicating outwardly flaring front and inwardly flaring rear portions and having openings at the contiguous or constricted ends and entirely within the outwardly flaring front portions of the discharge ports and connecting the bore with the outwardly flaring front portions of the

inner constricted ends of said outwardly flaring front portions of the discharge ports.

3. An oil or gas burner including a nozzle having a central bore and a plurality of separated and radially arranged superficial longitudinally extending discharge ports with communicating outwardly flaring front and inwardly flaring near portions and having openings at the contiguous or constricted ends and entirely within the outwardly flaring front portions of the discharge ports and connecting the bore with the outwardly flaring front portion at the constricted ends of said outwardly flaring front portions of the ports.

4. An oil or gas burner including a nozzle having a central bore and a plurality of circularly and radially arranged superficial longitudinally extending discharge ports with communicating outwardly flaring front and inwardly flaring rear portions arranged on a larger radius than said outwardly flaring front portions and having openings at the contiguous or constricted ends and entirely within the outwardly flaring front portions of the discharge ports and connecting the bore with the outwardly flaring front portion at the constricted ends of said outwardly flaring portions of the ports.

5. An oil or gas burner comprising a hollow casing provided with a supply opening, a fuel supply pipe, a nozzle within said casing having a central bore connected with said fuel supply pipe and provided with a plurality of superficial longitudinally extending discharge ports with communicating outwardly flaring front and inwardly flaring rear portions, said inwardly flaring rear portions being in communication with said supply opening and the outwardly flaring front portions being in communication with the fuel supply pipe at the inner constricted ends and solely and entirely within said outwardly flaring front portions of the ports.

6. An oil or gas burner comprising a hollow casing provided with a supply opening, a fuel supply pipe, a nozzle within said casing having a central bore connected with said fuel supply pipe and provided with a plurality of superficial longitudinally extending discharge ports with communicating outwardly flaring front and inwardly flaring rear portions, said inwardly flaring rear portions being in communication with said supply opening and the outwardly flaring front portions being depressed towards the axis of the burner and in communication with the fuel supply pipe at the inner constricted ends and solely and entirely within said outwardly flaring front portions of the ports.

7. An oil or gas burner comprising a hollow casing provided with a supply opening, a fuel supply pipe, a nozzle within said casing having a central bore connected with said fuel supply pipe, and said nozzle provided with a plurality of circularly and radially superficial longitudinally extending discharge ports with communicating outwardly flaring front and inwardly flaring rear portions, said inwardly flaring rear portions being in communication with said supply opening and the outwardly flaring front portions being stepped and in communication with the fuel supply pipe at the inner constricted ends or throats of and solely and entirely within said outwardly flaring front portions of the ports.

In testimony whereof I affix my signature.

ALFRED G. SCHUMANN.